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A NEW VARIETY OF IVA CILIATA FROM INDIAN ROCK SHELTERS IN THE SOUTH-CENTRAL UNITED STATES

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Some time ago Mr. Volney H. Jones, of the Ethnobotanical Laboratory, University of Michigan, sent me for examination fruits of *Iva* and *Ambrosia* from Indian rock-shelters in Arkansas, Missouri, and Kentucky. Although these could be referred definitely to *Iva ciliata* Willd. and *Ambrosia trifida* L., respectively, they were so much larger than any fruits found on herbarium material as to suggest that they might represent distinguishable varieties, possibly evolved through cultivation and selection by the Indians. Mr. Jones has since sent me all the material at hand of these genera from eight rock-shelters in the states mentioned.[1] Study of this material, in connection with published reports of its manner of occurrence in the rock-shelters, leads to the conclusion that these aboriginal specimens represent large-fruited strains developed as sources of food by the bluff-dwellers, and that in the case of the *Iva* the differences are sufficient to justify varietal separation.

The rock-shelters from which the specimens come are located in Carroll, Benton, and Madison Counties, Arkansas; along the Elk River, McDonald County, Missouri; and in Menifee County, Kentucky. The ethnobotany of the Arkansas and Missouri localities, which are in the Ozark Mountains, has been described by Dr. Melvin

[1] The material on which this paper is based was collected by M. R. Harrington for the Museum of the American Indian, Heye Foundation; by W. S. Webb and W. D. Funkhouser for the University of Kentucky; and by S. C. Dellinger for the University of Arkansas. Thanks are due to G. G. Heye and E. K. Burnett, W. S. Webb, and S. C. Dellinger of these institutions respectively for making specimens and data available for study, and to Mr. Volney H. Jones for forwarding the specimens to me and for helpful suggestions in the preparation of this paper.

R. Gilmore,[1] that of the Kentucky locality by Mr. Jones.[2] The rock-shelters themselves are very shallow caves, really mere undercuttings, eroded in precipitous limestone or sandstone bluffs along river gorges. Very little is known about the Indians who inhabited them, beyond the fact that they were certainly pre-Columbian.[3] Gilmore suggests that the Ozark bluff-dwellers may have been contemporaneous with the Basket-maker culture of southern Utah, which is known to be much earlier than the earliest Pueblo culture. Webb and Funkhouser consider it possible that the Kentucky rock-shelter Indians were among the oldest, if not the oldest, prehistoric inhabitants of the state. Both the Ozark and the Kentucky peoples were farmers and left abundant vegetal remains in bags and caches as well as in their feces. Among the more important of their cultivated plants were Indian corn (*Zea mays* L.), Carolina canary grass (*Phalaris caroliniana* Walt.), pigweed (*Amaranthus* sp.), lambsquarters (*Chenopodium* spp.), squash (*Cucurbita pepo* L.), marsh-elder (*Iva ciliata* Willd. var.), giant ragweed (*Ambrosia trifida* L.), and sunflower (*Helianthus annuus* L.). Corn and squash remains are abundant in the Ozarks but rare in the Kentucky shelters, although in general the botanical features of the two cultures are remarkably similar. The rarity of tobacco is interesting. No tobacco or pipes were found in the Ozark shelters, and no pipes have been found in Kentucky. Jones records 3 capsules of a species of tobacco, probably *Nicotiana rustica* L., from the Newt Kash shelter. Tobacco pods and leaves have been reported by B. H. Young and N. C. Nelson from other caves in Kentucky. In any case, the absence of pipes seems to indicate that tobacco was not smoked in this region.

The principal distinctive common feature of the ethnobotany of these two cultures is the occurrence of fruits ("seeds") of two Composites, forms of *Iva ciliata* and *Ambrosia trifida*, both differing from living representatives of these species in their greater size. Gilmore examined a considerable quantity of achenes of the *Iva* in caches from the Ozark shelters but was unable to determine the use to which they

[1] Vegetal remains of the Ozark bluff-dweller culture, Papers Mich. Acad. Sci. **14**: 83–112. *pl. 24–25*. 1931.

[2] The vegetal remains of Newt Kash Hollow shelter, Univ. Kentucky Rep. Arch. & Anthrop. **3**: 147–165. 1936 (forming a section of the paper, Rock shelters in Menifee County, Kentucky, by W. S. Webb and W. D. Funkhouser).

[3] The following papers may be consulted in this connection: M. R. Harrington, The Ozark bluff-dwellers, Amer. Anthropologist **26**: 1–21. 1924; W. S. Webb & W. D. Funkhouser, Archaeological survey of Kentucky, University Kentucky Rep. Arch. & Anthrop. **2**: 419–421. 1932.

had been put, although he suggested the possibility of use as perfume or medicine.[1] In the Newt Kash Hollow shelter in Kentucky the same large-fruited form of this plant was found sparingly throughout the material and in great quantity in every sample of feces examined. The achenes were apparently eaten entire without removing the coat. Jones believes that the great amount of these achenes in the feces indicates that they were used as food, but that the possibility of use as medicine must not be overlooked. He considers that their much greater size as compared with the wild forms now known may be attributed to cultivation, and that the occurrence of this typically prairie plant in such abundance may be due to human introduction as a food plant, although the occurrence of other prairie forms indicates that the region might have been in the prairie stage at the time the shelters were inhabited.

The fruits of a form of *Ambrosia trifida* were found in great abundance in the Ozark shelters, but only a single poorly preserved specimen in the Newt Kash Hollow shelter in Kentucky. Gilmore states that the Ozark specimens are four or five times the size of any that can be found growing as weeds at the present time and are of uniformly light color, suggesting cultivation and selective breeding. After satisfying himself as to their edibility by eating newly ripened achenes, he concluded that the plant was cultivated as a grain crop, although he suggests also that it may have been used to furnish a red dye as it has been by other Indians in historic times.[2] Gilmore's estimate of the size of the rock shelter "seeds" must have been based on comparison with rather small modern ones. I was at first inclined to regard the ancient specimens as worthy of varietal distinction on the basis of their greater size, but after seeing more of them and collecting selected fresh specimens in Washington, D. C., I discovered that all but the very largest of the Ozark specimens could be matched among modern material. Rydberg describes the fruit as about 7 mm. long, and a sample of fresh specimens from Washington County, Arkansas, submitted by Mr. Jones, contains none more than 7.5 mm. long, from which size they grade down to 5 mm. in total length. The Ozark fruits vary from 7 to 13 mm. in total length, but one over 10 or 11 mm. is decidedly exceptional in the material submitted to me. A collection of fruits I made in rich soil along the Chesapeake and Ohio Canal in

[1] Gilmore, l. c. 87, 101. The material was wrongly identified and recorded as *Iva xanthifolia* Nutt.

[2] Gilmore, l. c. 86, 101.

Washington runs from 7.5 to 10.5 mm. in length, and when placed beside a collection from the Ozarks matches it so well, except for the occasional larger fruits in the Ozark material, that varietal separation would not be justified.

The striking difference in size between the achenes of *Iva* from these ancient rock-shelters and those of the living form, however, makes it desirable to differentiate them by a varietal name, even though it is most probable that they represent merely an ancient cultivated strain obtained by selection, and now extinct. The difference in size is in fact so great as to suggest that a different species may have been represented, but the absence of any other observable difference makes this interpretation inadvisable.

Iva ciliata Willd. var. **macrocarpa** Blake, var. nov. Achenia 4.8–9.3 mm. longa 3.2–5.7 mm. lata in utraque facie 3–5(–7)-costata.—Kentucky: Newt Kash Hollow shelter, Menefee Co., 1935, *W. S. Webb & W. D. Funkhouser* (Univ. Mich. Ethnobot. Lab. 1210, 1216, 1217). Missouri: Montgomery shelter, Barry Co., 1925, *S. C. Dellinger* (type no. 37413, Nat. Arboretum Herb.; dupls. in Univ. Ark. Mus., U. S. Nat. Herb., Gray Herb.). Arkansas: Worley rock-shelter, Madison Co., *Dellinger* (Univ. Ark. Mus. 1); Allred Bluff shelter, Benton Co., *Dellinger* (Univ. Ark. Mus. 45, 90), *M. R. Harrington* (Mus. Amer. Indian 11/7380); Agnew Bluff shelter, Benton Co., *Dellinger* (Univ. Ark. Mus. 52); Alum Cave Bluff shelter, Benton Co., *Harrington* (Mus. Amer. Indian 11/7597).

The achenes of modern specimens of *Iva ciliata* are variable in size, shape, and ribbing. They are narrowly or broadly obovate in outline, with or without a definite narrowed stipe-like base, and measure (1.9) 2.3–3.8 mm. in length by (1.5) 1.8–2.6 mm. in width. They are always more or less obcompressed; some are decidedly thickened and nearly evenly lenticular, others are plano-convex, and some, usually the largest, are strongly flattened dorso-ventrally. The smaller ones are usually ribless; the larger are likely to have 3 longitudinal ribs on each face. The apex of the achene, sometimes the margin and surface also, is sparsely hirsutulous or sometimes practically glabrous; the surface is greenish-brown or fuscous, finely longitudinally muriculate-lineolate and sometimes more or less transversely rugulose, and bears scattered sessile glands. The contrast between all the achenes from the rock-shelters and the smaller ribless ones from modern specimens is so great that one would not hesitate to regard them as specifically distinct were the gap not partly bridged by the larger and 3-ribbed modern specimens. On the whole, it seems more likely that the rock-

shelter form represents a large-fruited strain developed by selection than that it is a distinct species or the normal wild ancestral form of the modern plant.

In the bottle of achenes of the type collection I have found also a couple of phyllaries (involucral bracts), one with an achene and a piece of the receptacle bearing several staminate flowers attached, as well as a loose staminate flower. So far as the state of the material permits comparison, there seems to be no difference from the living plant except that of size. The larger (empty) phyllary is about 6.5 mm. long and 3.6 mm. wide, the smaller about 3.8 mm. long and 3 mm. wide. The latter bears a few bristly hairs on the back, as do the modern specimens. A detached staminate flower is 4 mm. long; those borne on the receptacle attached to the smaller phyllary mentioned above are about 3.5 mm. long. A single receptacular pale with them

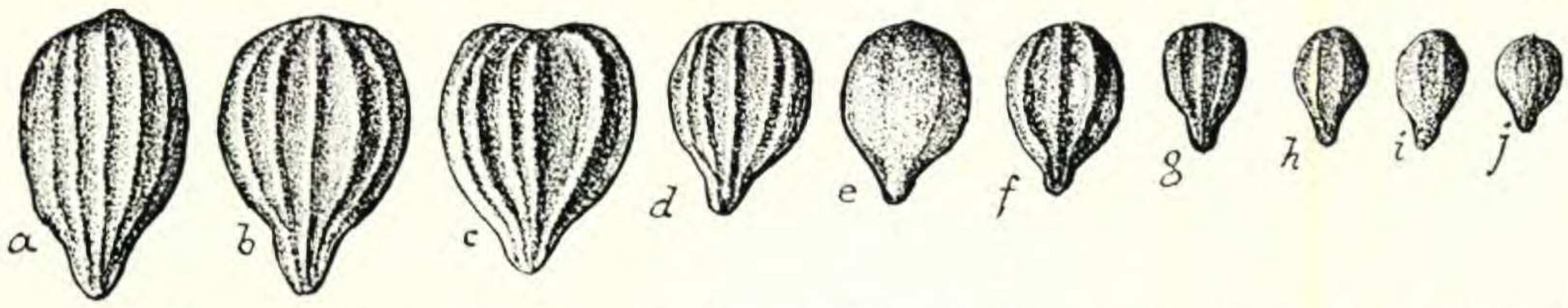

FIG. 1. *a–f*, IVA CILIATA var. MACROCARPA (from TYPE); *g–h*, I. CILIATA Willd., from *L. F. Ward*, near Belvidere, Kansas, 26 Sept. 1897 (U. S. Nat. Herb.); *i–j*, I. CILIATA, from *Hall & Harbour* 262, American Plains Flora, 1862 (U. S. Nat. Herb.). All × 2.

is about the same length and bears sessile glands along the margin just as do modern specimens, which measure little more than half its length.

A form of the *Iva ciliata* group has been described by Small[1] as *Iva caudata*, and is maintained by Rydberg[2] in the "North American Flora." The only really distinctive feature that appears in their keys and descriptions is the shape of the bracts of the inflorescence. These are described by Rydberg as "ovate to lanceolate, short-acuminate, hispid-ciliate along nearly the whole margin" in *I. ciliata*, and "linear or linear-lanceolate, caudate-acuminate, ciliate only at the base" in *I. caudata*. Small's key character is the same, except that he does not mention a difference in pubescence of the bracts. *Iva caudata* was originally described from Louisiana and Mississippi, but the range of the two as given by Rydberg is essentially the same, except that *I. caudata* is given a range from Illinois and Missouri to Mississippi and

[1] Bull. N. Y. Bot. Gard. **1**: 290. 1899.
[2] N. Amer. Fl. **33**: 5. 1922.

Louisiana, while *I. ciliata* is permitted to grow from the same eastern limit west to Nebraska and New Mexico. Examination of the specimens in the United States National Herbarium shows that the attempted separation corresponds to nothing in nature. The bracts vary from narrowly linear-lanceolate and attenuate to ovate and short-acuminate. The extremes are naturally quite different in appearance, but are connected by such a series of intergrades that no specific or even varietal distinction can be drawn. The alleged difference in pubescence of the bracts mentioned by Rydberg is non-existent. In his original description Small stated that the leaves were thinner and smoother. This is obviously an ecological feature associated with growth in a damp, shady habitat. A specimen from Mississippi labeled *I. caudata* by Rydberg has relatively thick, rough leaves, as do others from Texas (*Ruth* 538; *Joor; Havard*) which have bracts quite as narrow as in specimens labeled *Iva caudata* by Rydberg. *Iva caudata* must be referred outright to the synonymy of *I. ciliata*.

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PANICUM TUCKERMANI A VARIETY OF PANICUM PHILADELPHICUM

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Hitchcock[1] and Fernald[2] have regarded *Panicum Tuckermani* Fernald as a valid species of northern distribution, from Quebec and northern Maine to Connecticut, New York, Indiana, and Wisconsin.

A careful study, in the herbarium of Field Museum, of the *capillare*-group of the genus *Panicum* convinced the writers that more specimens than were accessible to us needed to be studied in order to clarify our concepts regarding *Panicum philadelphicum* Bernh., *P. Tuckermani* Fernald, and *P. Gattingeri* Nash. Since the herbarium of Field Museum contained only one specimen of *P. Tuckermani* which had been determined by Fernald (Maine: exsiccated clay, Orono, August 18, 1908, *M. L. Fernald*, in Pl. Exsicc. Gray, no. 113) specimens of *P. Tuckermani* were, therefore, borrowed from the Gray Herbarium. Of the twenty-five specimens from the Gray Herbarium,

[1] Manual of the Grasses of the United States, U.S.D.A. Misc. Publ. no. 200. 667 (1935).

[2] Rhodora **21:** 111–114. 1919.